

Modellierung, Simulation und Optimierung für den Masterstudiengang Mathematik (gem. § 49 FPO Mathe)

| Modul Nr. | Modulbezeichnung | Modulverantwortlicher | Lehrveranstaltung | SWS | | | | | Gesamt ECTS | Workload-Verteilung pro Semester in ECTS-Punkten: | | | | Art und Umfang der Prüfung/Studienleistung | Modul Nr. |
|-----------|---|-----------------------|--|-----|---|---|---|---|-------------|---|--------|--------|--------|--|-----------|
| | | | | V | Ü | P | S | T | | 1. Sem | 2. Sem | 3. Sem | 4. Sem | | |
| | Advanced Algorithms for Nonlinear Optimization (AlgNLOpt) | Michael Stingl | Advanced Algorithms for Nonlinear Optimization | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorials to Advanced Algorithms for Nonlinear Optimization | | ½ | | | | | 1 | | | | | |
| | Advanced Discretization Techniques (AdDiscTech) | Eberhard Bänsch | Advanced Discretization Techniques | 4 | | | | | 10 | 8 | | | | mündliche Prüfung (20 min) | |
| | | | Tutorials to Advanced Discretization Techniques | | 1 | | | | | 2 | | | | | |
| | Advanced Nonlinear Optimization (AdvNLOpt) | Wolfgang Achtziger | Advanced Nonlinear Optimization | 4 | | | | | 10 | 8 | | | | mündliche Prüfung (20 min) | |
| | | | Tutorials to Advanced Nonlinear Optimization | | 1 | | | | | 2 | | | | | |
| | Advanced Solution Techniques (AdSolTech) | Peter Knabner | Advanced Solution Techniques | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorials to Advanced Solution Techniques | | ½ | | | | | 1 | | | | | |
| | Asymptotic Analysis and Modeling (AsyMo) | Peter Knabner | Asymptotic Analysis and Modeling | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorials to Asymptotic Analysis and Modeling | | ½ | | | | | 1 | | | | | |
| | Ausgewählte Kapitel der Nichtlinearen Optimierung (AKNIOpt) | Wolfgang Achtziger | Ausgewählte Kapitel der Nichtlinearen Optimierung | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Übungen zu Ausgewählte Kapitel der Nichtlinearen Optimierung | | 2 | | | | | 1 | | | | | |
| | Ausgewählte Kapitel zu Partiellen Differentialgleichungen (A-PDG) | Frank Duzaar | Ausgewählte Kapitel zu Partiellen Differentialgleichungen | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Übungen zu Ausgewählte Kapitel zu Partiellen Differentialgleichungen | | 1 | | | | | 1 | | | | | |
| | Diskrete Optimierung I (DiskOpt I) | Alexander Martin | Diskrete Optimierung I | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Übung zu Diskrete Optimierung I | | 1 | | | | | 1 | | | | | |
| | Diskrete Optimierung II (DiskOpt II) | Alexander Martin | Diskrete Optimierung II | 4 | | | | | 10 | 8 | | | | mündliche Prüfung (20 min) | |
| | | | Übung zu Diskrete Optimierung II | | 2 | | | | | 2 | | | | | |
| | Dualität und Optimierung (DualOpt) | Wolfgang Achtziger | Dualität und Optimierung | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Übungen zu Dualität und Optimierung | | ½ | | | | | 1 | | | | | |
| | Funktionalanalysis II (FA2) ¹ | Hermann Schulz-Baldes | Funktionalanalysis II | 4 | | | | | 10 | 8 | | | | mündliche Prüfung (20 min) | |
| | | | Übung zu Funktionalanalysis II | | 1 | | | | | 2 | | | | | |
| | Introduction to Material- and Shape Optimization (MSOpt) | Michael Stingl | Introduction to Material and Shape Optimization | 4 | | | | | 10 | 8 | | | | mündliche Prüfung (20 min) | |
| | | | Tutorials to Introduction to Material and Shape Optimization | | 1 | | | | | 2 | | | | | |
| | Inverse Problems and their Regularization (IPReg) | Martin Burger | Inverse Problems | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorials to Inverse Problems | | ½ | | | | | 1 | | | | | |
| | Mathematical Modeling in the Life Sciences (MaMoLS) | Peter Knabner | Mathematical Modeling in the Life Sciences | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorials to Mathematical Modeling in the Life Sciences | | ½ | | | | | 1 | | | | | |
| | Mathematics of Multiscale Models (MaMM) | Peter Knabner | Mathematics of Multiscale Models | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorials to Mathematics of Multiscale Models | | ½ | | | | | 1 | | | | | |
| | Mathematics of wetting phenomena | Günther Grün | Mathematics of wetting phenomena | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorials to Mathematics of wetting phenomena | | ½ | | | | | 1 | | | | | |
| | Mathematische Bildverarbeitung (MathBild) | J. Michael Fried | Mathematische Bildverarbeitung | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Übung zu Mathematische Bildverarbeitung | | 1 | | | | | 1 | | | | | |
| | Modeling and Analysis in Continuum Mechanics I (ModAna1) | Günther Grün | Modeling and Analysis in Continuum Mechanics 1 | 4 | | | | | 10 | 8 | | | | mündliche Prüfung (20 min) | |
| | | | Tutorials to Modeling and Analysis in Continuum Mechanics 1 | | 1 | | | | | 2 | | | | | |
| | Modeling and Analysis in Continuum Mechanics II (ModAna2) | Günther Grün | Modeling and Analysis in Continuum Mechanics 2 | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorials to Modeling and Analysis in Continuum Mechanics 2 | | ½ | | | | | 1 | | | | | |
| | Nichtglatte Optimierung (nicht vertieft) (NglOnv) | Wolfgang Achtziger | Nichtglatte Optimierung | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Übungen zu Nichtglatte Optimierung | | ½ | | | | | 1 | | | | | |
| | Numerical Aspects of Linear and Integer Programming (NALIP) | Alexander Martin | Numerical Aspects of Linear and Integer Programming | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Übung zu Numerical Aspects of Linear and Integer Programming | | ½ | | | | | 1 | | | | | |
| | Numerics of incompressible flows 1 (NUIF1) | Eberhard Bänsch | Numerics for incompressible flows 1 | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorials to Numerics for incompressible flows 1 | | ½ | | | | | 1 | | | | | |

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| | | | | V | Ü | P | S | T | | 1. Sem. | 2. Sem. | 3. Sem. | 4. Sem. | | |
| | Numerics of incompressible flows 2 (NUIF2) | Eberhard Bänsch | Numerics for incompressible flows 2 | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorials to Numerics for incompressible flows 2 | | ½ | | | | | 1 | | | | | |
| | Numerics of Multi-Physics Problems (NuPDAE) | Peter Knabner | Numerics for Multi-Physics Problems | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorials to Numerics for Multi-Physics Problems | | ½ | | | | | 1 | | | | | |
| | Numerics of Stochastic Evolution Equations | Günther Grün | Numerics of Stochastic Evolution Equations | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorials to Numerics of Stochastic Evolution Equations | | ½ | | | | | 1 | | | | | |
| | Numerik der Navier-Stokes-Gleichungen mit Hilfe des Software-Frameworks Navier (NumNavier) | Eberhard Bänsch | Einführung in den Strömungslöser NAVIER | | | 2 | | | 5 | 4 | | | | Vortrag 30 Minuten, schriftliche Ausarbeitung | |
| | | | Numerik der Navier-Stokes-Gleichungen mit Hilfe des Software-Frameworks Navier | | | 2 | | | | 1 | | | | | |
| | Numerik der Optimalen Steuerungen (NOS) | Günter Leugering | Numerik der Optimalen Steuerungen | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Übungen zu Numerik der Optimalen Steuerungen | | ½ | | | | | 1 | | | | | |
| | Optimierung in Industrie und Wirtschaft (OptW) | Frauke Liers | Vorlesung Optimization in Industry and Economy | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Übungen zu Optimization in Industry and Economy | | 1 | | | | | 1 | | | | | |
| | Optimization with Partial Differential Equations | Michael Stingl | Optimization with Partial Differential Equations | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorials to Optimization with Partial Differential Equations | | ½ | | | | | 1 | | | | | |
| | Partial Differential Equations based Image Processing | Michael Fried | PDE based Image Processing | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorials to PDE based Image Processing | | ½ | | | | | 1 | | | | | |
| | Partial Differential Equations in Finance | Günther Grün | Partial Differential Equations in Finance | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorials to Partial Differential Equations in Finance | | ½ | | | | | 1 | | | | | |
| | Partielle Differentialgleichungen I (PDG I) | Günther Grün | Partielle Differentialgleichungen I | 4 | | | | | 10 | 8 | | | | mündliche Prüfung (20 min) | |
| | | | Übungen zu Partielle Differentialgleichungen I | | 2 | | | | | 2 | | | | | |
| | Partielle Differentialgleichungen II (PDG II) | Jens Habermann | Partielle Differentialgleichungen II | 4 | | | | | 10 | 8 | | | | mündliche Prüfung (20 min) | |
| | | | Übungen zu Partielle Differentialgleichungen II | | 2 | | | | | 2 | | | | | |
| | Practical Course: Modeling, Simulation, Optimization (MoSi) | Peter Knabner | Modeling, Simulation and Optimization (practical course) | | | | 3 | | 5 | 5 | | | | Vortrag 45 Minuten, schriftliche Ausarbeitung (10-15 Seiten) | |
| | Reelle Analysis (RAAna) | Frank Duzaar | Reelle Analysis | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Übungen zu Reelle Analysis | | 1 | | | | | 1 | | | | | |
| | Robuste Optimierung 2 | Frauke Liers | Robuste Optimierung 2 | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Übung zu Robuste Optimierung 2 | | 1 | | | | | 1 | | | | | |
| | Shape Optimization (ShapeOpt) | Günter Leugering | Shape Optimization | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorial to Shape Optimization | | 1 | | | | | 1 | | | | | |
| | Theorie der Optimalsteuerungen (TOS) | Günter Leugering | Theorie der Optimalsteuerungen | 4 | | | | | 10 | 8 | | | | mündliche Prüfung (20 min) | |
| | | | Übung zu Theorie der Optimalsteuerungen | | 1 | | | | | 2 | | | | | |
| | Transport and Reaction in Porous Media: Modeling (RTpMNum) | Serge Kräutle | Transport and Reaction in Porous Media: Modeling | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorials to Transport and Reaction in Porous Media: Modeling | | ½ | | | | | 1 | | | | | |
| | Transport and Reaction in Porous Media: Simulation | Peter Knabner | Transport and Reaction in Porous Media: Simulation | 2 | | | | | 5 | 4 | | | | mündliche Prüfung (15 min) | |
| | | | Tutorials to Transport and Reaction in Porous Media: Simulation | | ½ | | | | | 1 | | | | | |
| | Vertiefte Nichtlineare Optimierung (VNLO) | Wolfgang Achtziger | Vertiefte Nichtlineare Optimierung | 4 | | | | | 10 | 8 | | | | mündliche Prüfung (20 min) | |
| | | | Übungen zu Vertiefte Nichtlineare Optimierung | | 2 | | | | | 2 | | | | | |
| Summe Hauptstudienrichtung (Nebenstudienrichtung) für den Masterstudiengang Mathematik | | | | | | | | | 35(25) | 15(10) | 10(10) | 10(5) | 0(0) | | |

Fußnoten:

¹ Funktionalanalysis und Operatortheorie (FAO)